AMENDED CLAIMS
[received by the International Bureau on 29 April 2005 (29.04.2005);
original claims 1-34 replaced by amended claims 1-34 (4 pages)]

Claims

1. A protein-based film comprising a protein network formed by disulfide bonds between the proteins comprising a protein network which has been formed by treating proteins with modified protein in a solution, which protein has been modified by cleaving at least one disulfide bond originally present in said protein by sulfitolysis to obtain free sulfhydryl groups, whereupon an interchange reaction by said free sulfhydryl groups has occurred forming said disulfide bonds between the proteins, **characterized** in that the pH of said solution was 7 or below.

2. The protein-based film of claim 1, **characterized** in that said film has been formed without heat treatment.

3. The protein-based film of claim 1 or 2, **characterized** in that the amount of free sulfhydryl groups in the total protein of the solution before the interchange reaction was 0.5–60 μmol/g protein.

4. The protein-based film of any of the preceding claims, **characterized** in that said modified protein comprises whey protein, such as the soluble fraction or precipitate fraction of modified whey protein or combinations thereof.

5. The protein-based film of any of the preceding claims, **characterized** in that said protein has been sulfonated by said sulfitolysis by contacting it with sulfite ion forming agent, such as alkali metal or earth alkali metal sulfite, hydrogen sulfite or metabisulfite, or combinations thereof.

6. The protein-based film of any of the preceding claims, **characterized** in that it further contains strength-improving agent, such as carbohydrate, such as maltodextrin or other starch hydrolysate.

7. The protein-based film of claim 6, **characterized** in that said film remains substantially intact in 0.1 M HCl (pH 2) at 37 °C for at least 6 hours before dissolving.

8. The protein-based film of claim 6, **characterized** in that said film remains substantially intact in 0.1 M HCl (pH 2) containing 0.1 % pepsin at 37 °C for at least 30 minutes before dissolving.

9. The protein-based film of any of the preceding claims, **characterized** in that it further contains plasticizer or lipophilic compound, such as stearate, butter fat as oil or true oil or combinations thereof.

10. The protein-based film of any of the preceding claims, **characterized** in that it further contains pigment dye, such as titanium oxide, antiadhesive agent, antimicrobial agent or preservative agent.

11. The protein-based film of any of the preceding claims, **characterized** in that said film has been formed on a substance to coat the substance.

12. The protein-based film of claim 11, **characterized** in that said substance is a food product.

13. The protein-based film of claim 11, **characterized** in that said substance is a tablet, granule, pellet or the like containing therapeutically active agent.

14. The protein-based film of any of the claims 1–11, **characterized** in that said film has been formed as a capsule shell.

15. The protein-based film of any of the claims 1–11, **characterized** in that said film has been formed around lipid, oil, lipophilic compound or combinations thereof to form an emulsion or microcapsule.

16. A food product, **characterized** in that has been coated with or contains substances coated with a film of any of the claims 1–15.

17. A baby's milk formula, **characterized** in that it contains film of claim 9 as an emulsion.

18. A pharmaceutical product containing at least one therapeutically active agent, **characterized** in that has been coated with a film of any of the claims 1–15.

19. A container, **characterized** in that has been coated with a film of any of the claims 1–15.

20. Method for preparing a protein-based film comprising a protein network formed by disulfide bonds between the proteins, comprising
- providing an amount of protein solution containing modified protein, which has been modified by cleaving at least one disulfide bond originally present in said protein by sulfitolysis to obtain free sulfhydryl groups, which are able to cause an interchange reaction to form disulfide bonds between the proteins, and
- forming said solution into said protein-based film, **characterized** in that the pH of said solution is 7 or below.

21. The method of claim 20, **characterized** in forming said film without heat treatment.

22. The method of claim 20 or 21, **characterized** in that the amount of the free sulfhydryl groups in the total protein of the solution before the interchange reaction is 0.5–60 μmol/g protein.

23. The method of any of the claims 20–22, **characterized** in that said protein has been sulfonated in said sulfitolysis by contacting it with sulfite ion forming agent.

24. The method of claim 23, **characterized** in that said sulfite ion forming agent comprises alkali metal or earth alkali metal sulfite, hydrogen sulfite or metabisulfite or combinations thereof.

25. The method of claim 24, **characterized** in that the amount of sulfite used is 0.01–0.06 % (w/v).

26. The method of any of the claims 20–25, **characterized** in that said modified protein comprises whey protein, such as the soluble fraction or precipitate fraction of modified whey protein or combinations thereof.

27. The method of any of the claims 20–26, **characterized** in further adding a plasticizer or lipophilic compound, such as stearate, butter fat as oil or true oil, or combinations thereof.

28. The method of any of the claims 20–27, **characterized** in further adding a strength-improving agent, such as carbohydrate, such as maltodextrin or other starch hydrolysate.

29. The method of any of the claims 20–28, **characterized** in further adding a pigment dye, such as titanium oxide, antiadhesive agent, antimicrobial agent or preservative agent.

30. The method of any of the claims 20–29, **characterized** in forming the film on a substance to coat the substance.

31. The method of claim 30, **characterized** in that said substance is a food product.

32. The method of claim 30, **characterized** in that said substance is a tablet, granule, pellet or the like containing therapeutically active agent.

33. The method of any of the claims 20–30, **characterized** in forming the film as a capsule shell.

34. The method of any of the claims 20–30, **characterized** in forming the film around lipid, oil, lipophilic compound or combinations thereof to form an emulsion or microcapsule.